NOTES 18: THE NORMAL DISTRIBUTION

Stat 120 | Fall 2025

Prof Amanda Luby

Three main topics of Stat120	Three	main	topics	of	Stat120):
------------------------------	-------	------	--------	----	---------	----

1. _____: Summarizing data with numbers and graphs

2. _____: Using confidence intervals to estimate parameters with uncertainty

3. _____: Using p-values to evaluate competing hypotheses

Up until now, we've relied on computer simulations (via StatKey or R) to generate ______ or _____ distributions.

We're now going to begin using ______ to generate these distributions instead

i Note

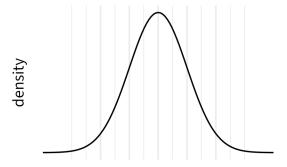
Normal Density Function:

$$f(x) = \frac{1}{\sqrt{2\pi\sigma}} e^{-\frac{1}{2\sigma^2}(x-\mu)^2}$$

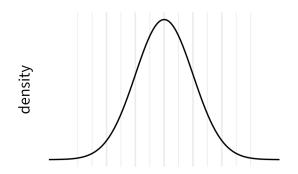
Notation:

Area under the curve =

Example 1: Verbal SAT scores follow a normal distribution with a population mean of $\mu=580$ and population standard deviation $\sigma=70$. What proportion of test-takers score above 650?



Example 2: What is the SAT score for the 90th percentile?



i Note
Z-scores:

i Note

Standard Normal Model

i Note

Central Limit Theorem: For random samples, if _____ is big enough, the sampling distribution of _____ is approximately _____, regardless of what shape the population distribution is.

CLT shortcut for testing:

CLT shortcut for confidence intervals:

Summary of R commands (sketch normal curves to help you remember)

```
pnorm(650, mean = 580, sd = 70, lower.tail = FALSE)
```

[1] 0.1587

qnorm(.9, mean = 0, sd = 1, lower.tail = TRUE)

[1] 1.282